

AYK REGION  
Norton Sound/  
Kotzebue Escape.  
Report #20

KWINIUK RIVER SALMON STUDIES

1979

Completed by  
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### Introduction

The Kwiniuk River is located about 98 miles northeast of Nome and drains into Norton Sound. A salmon counting tower was initiated on this system in 1965. Methodology has not changed significantly in recent years and will not be reprinted here. It can be reviewed in A-Y-K Fisheries Bulletin #35 (Kuhlmann, 1976).

### Objectives

1. Obtain daily and seasonal timing and magnitude of salmon escapement.
2. Periodically sample to Moses Point commercial salmon catch and Kwiniuk River escapement for age, sex and size composition.

### Results

The Kwiniuk River salmon counting tower crew was deployed on June 19. Unable to count fish due to high, turbid water conditions which flooded the camp site, the crew boated upstream daily in an attempt to locate and enumerate fish. Tower counting operations were initiated on an abbreviated schedule on June 27, but index counts (18 hours per day) began on July 8. The tower was erected near the 1965-1972 site instead of the 1975-1978 location due to the high water conditions (Figure 1). A background panel and weir was deployed in the east channel of the river in a successful attempt to direct migrating fish towards the tower site on the west bank. An unexpanded total of 107 chinook and an expanded total of 12,355 chum and 167,492 pink salmon were counted (Appendix Tables 2 and 3).

### Discussion

In an effort to determine the number of fish which were not counted prior to 7/8 and after 7/22, daily counts were expanded:

1. Individual missing hourly counts were expanded by averaging the last complete hourly count with the next complete hourly count.
2. Consecutive missing hourly counts were expanded by using hourly migration percentages presented in Tables 2 and 3.

These calculations indicate 12,101 chum and 161,578 pink salmon migrated past the tower between 6/27 and 7/25 (Table 4). These figures were additionally expanded by standard percentages to account for hours not normally counted; i.e. from 0600-1200 hours. This yielded final "expanded" totals.

Daily salmon migration totals for 1965-1978 were plotted against 1979 totals in an effort to determine the proportion of fish which may have passed the tower before and after counting operations were conducted (Figures 5 and 6, Table 5). Both chum and pink salmon migrations peaked during mid-July and it appears the vast majority of the escapements were enumerated.

Aerial survey estimates of Kwiniuk River escapements were made on 6/27, 7/8 and 7/12 (Table 6). Less than 100 fish were noted during the first survey, while 3,081 and 6,610 chums were counted during the subsequent surveys. All surveys were hampered by turbid water conditions in the tower river. The surveys did not indicate significant numbers of salmon were passing the tower uncounted.

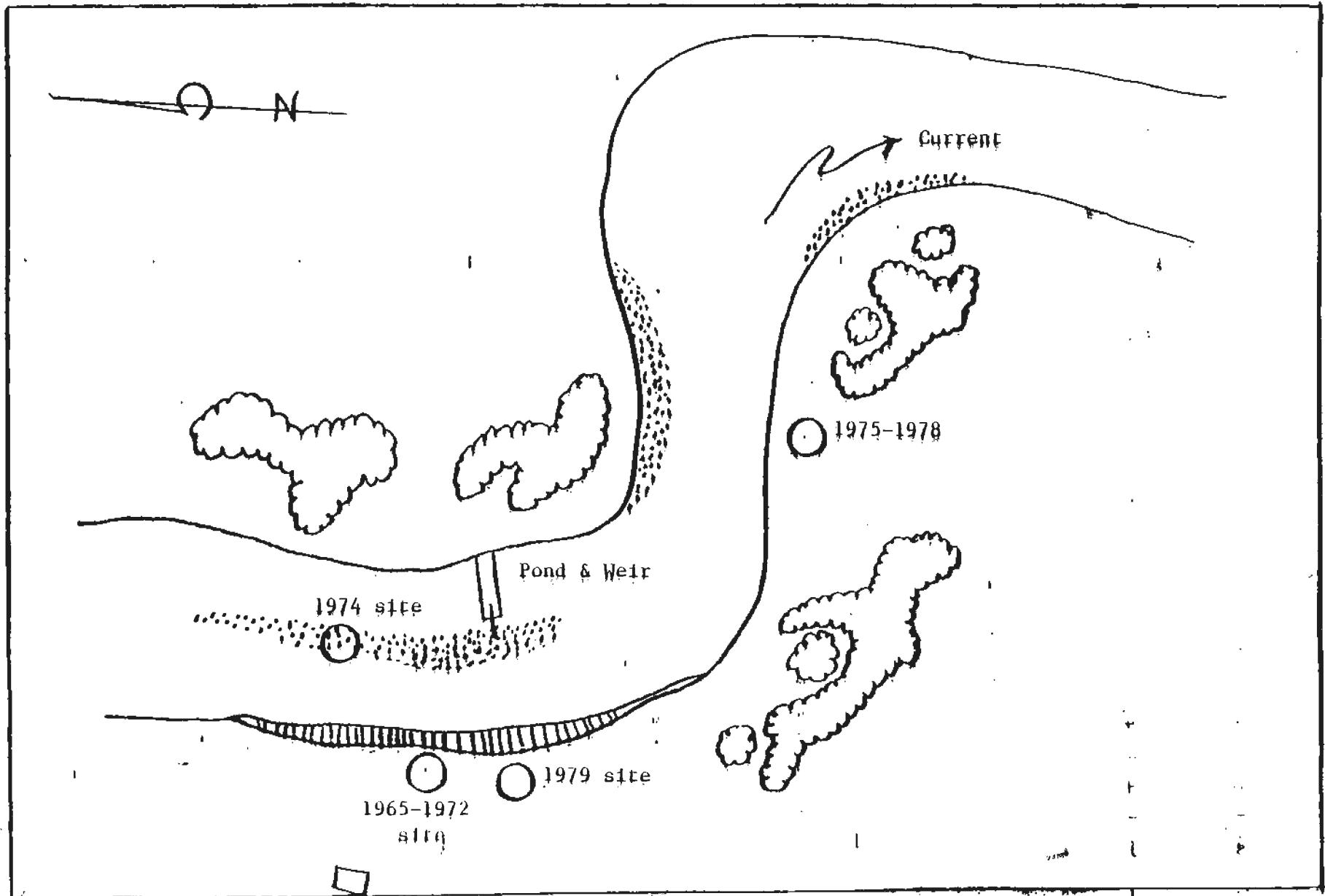


Figure 1. 1979 Kwiniuk River salmon counting tower site

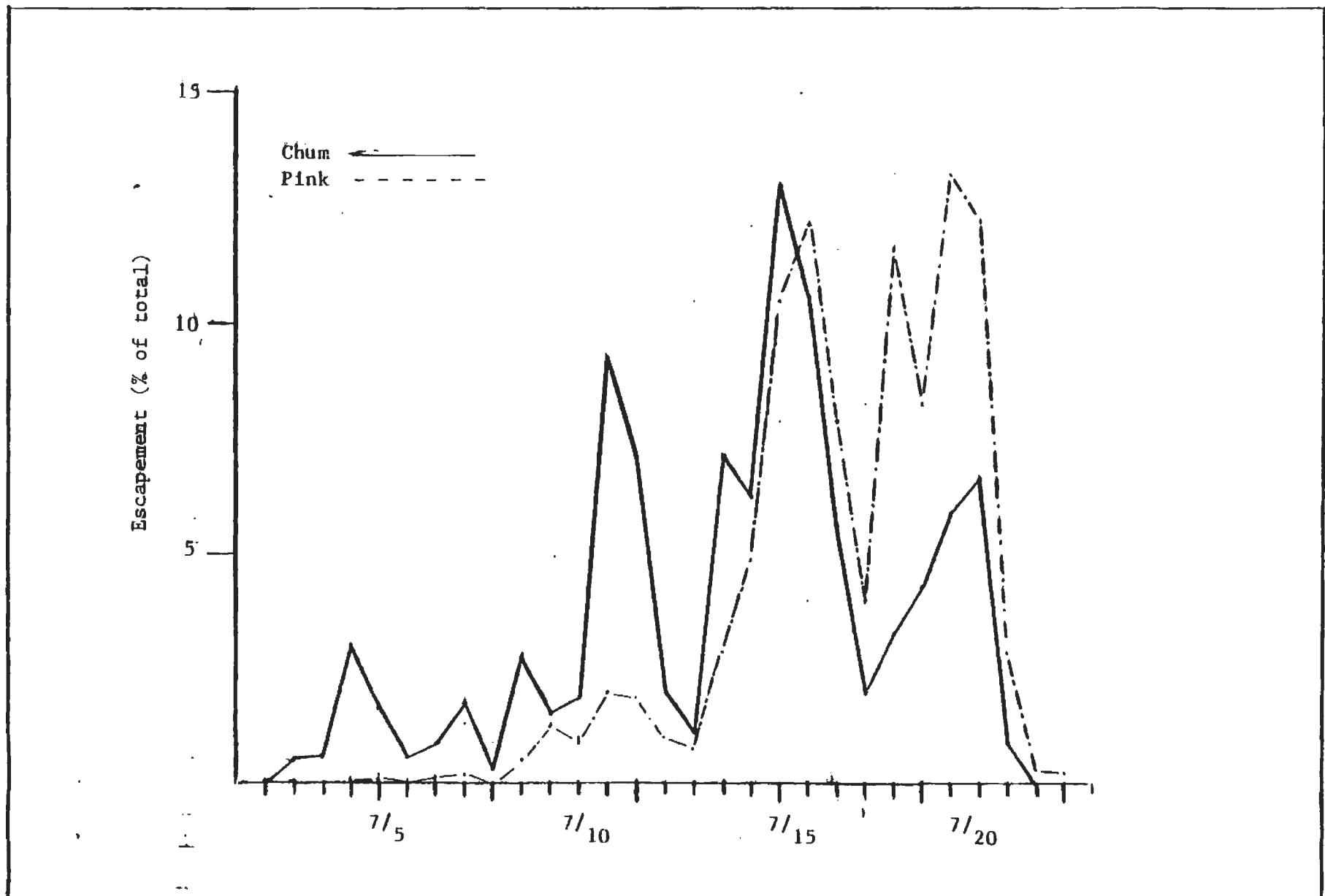


Figure 2. Daily Salmon Escapement past Kwiniuk River Counting Tower, 1979.

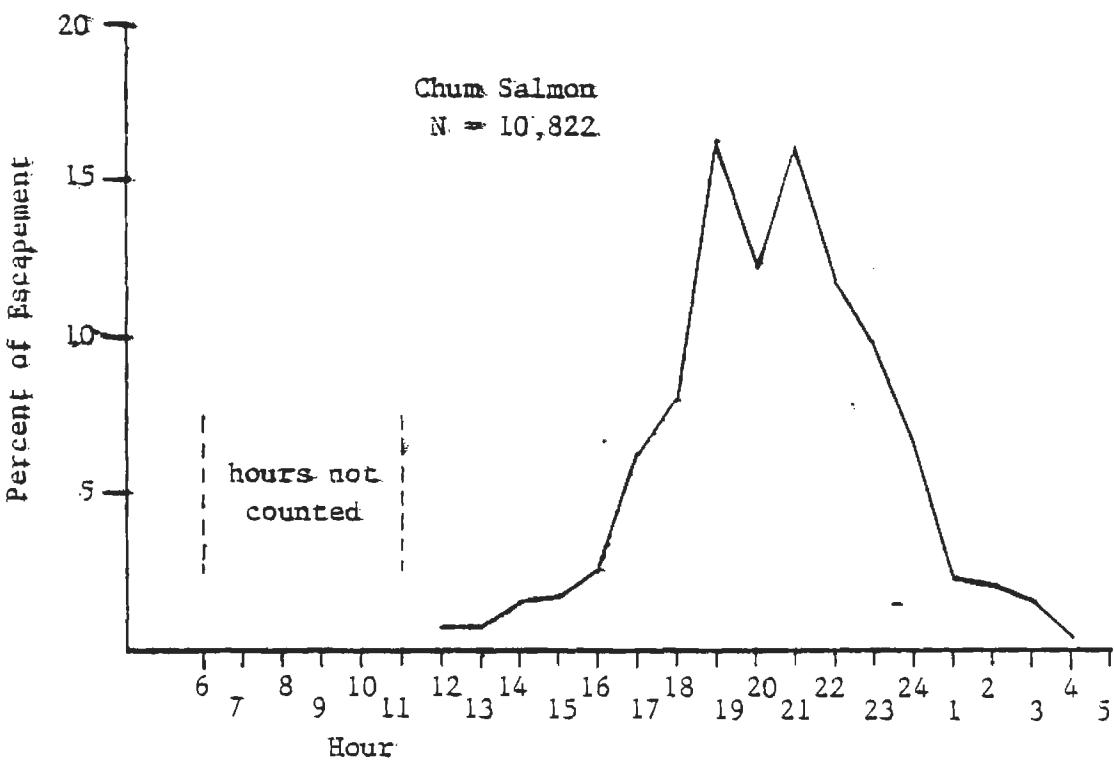
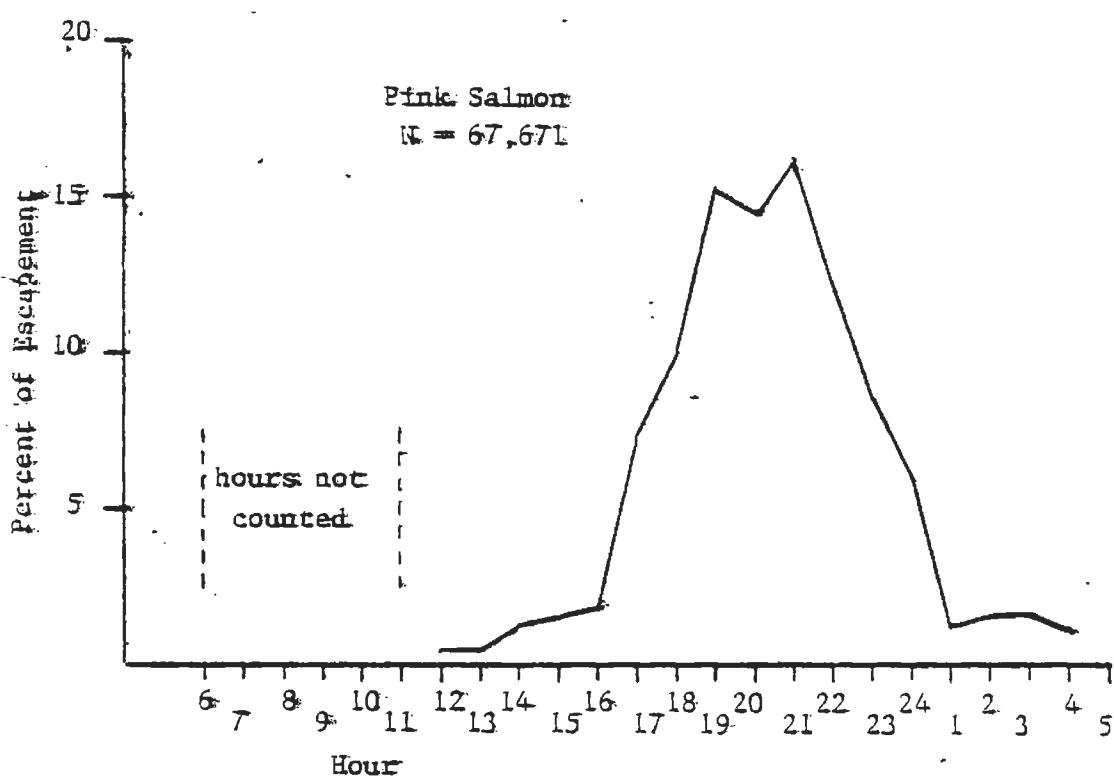


Figure 3. Hourly Migration of Chum and Pink Salmon Enumerated Past the Kwiniuk River Counting Tower, 1979.

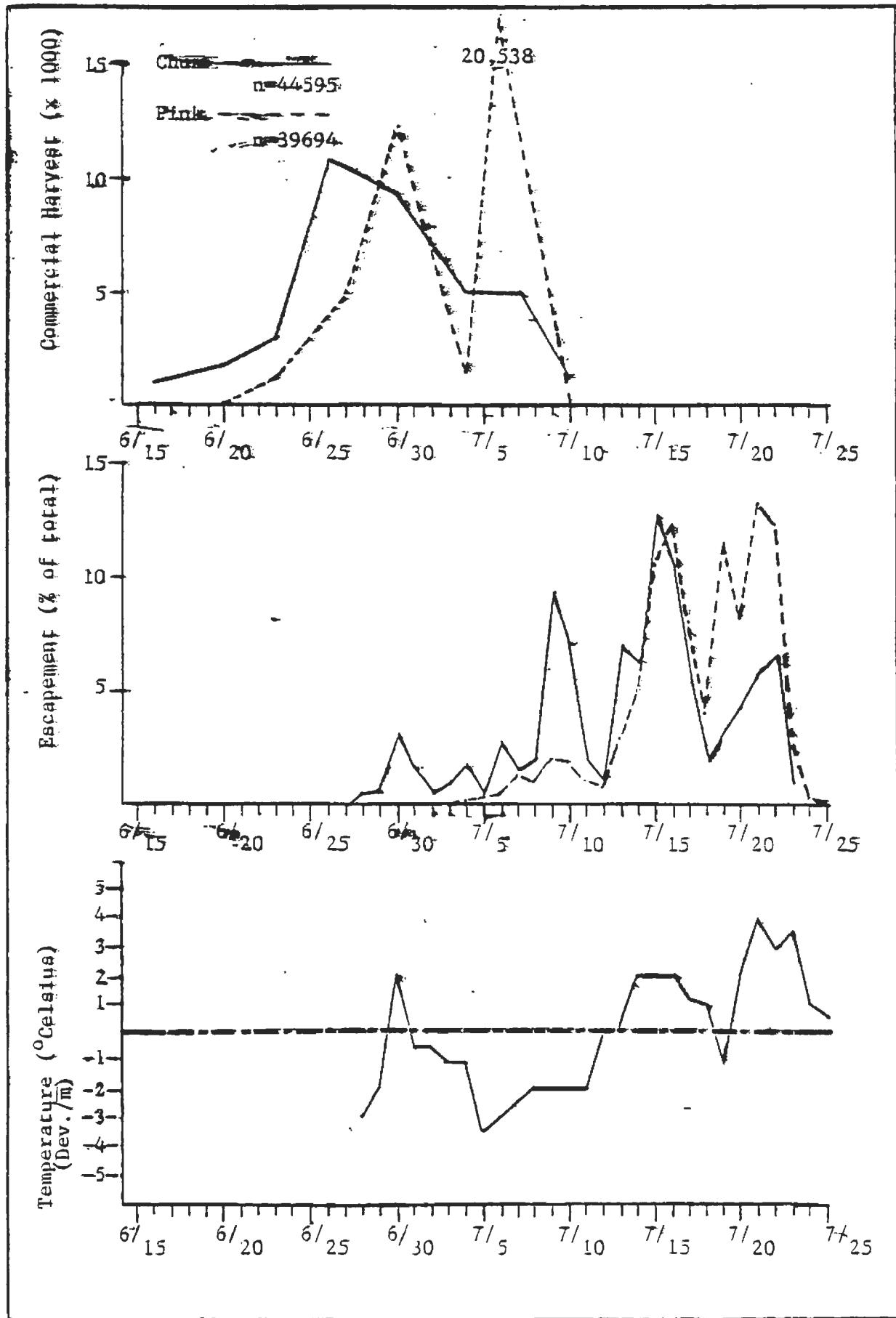


Figure 4. Kwiniuk River Water Temperature, Salmon Escapement, and Moses Point Commercial Salmon Harvest, by day, 1979.

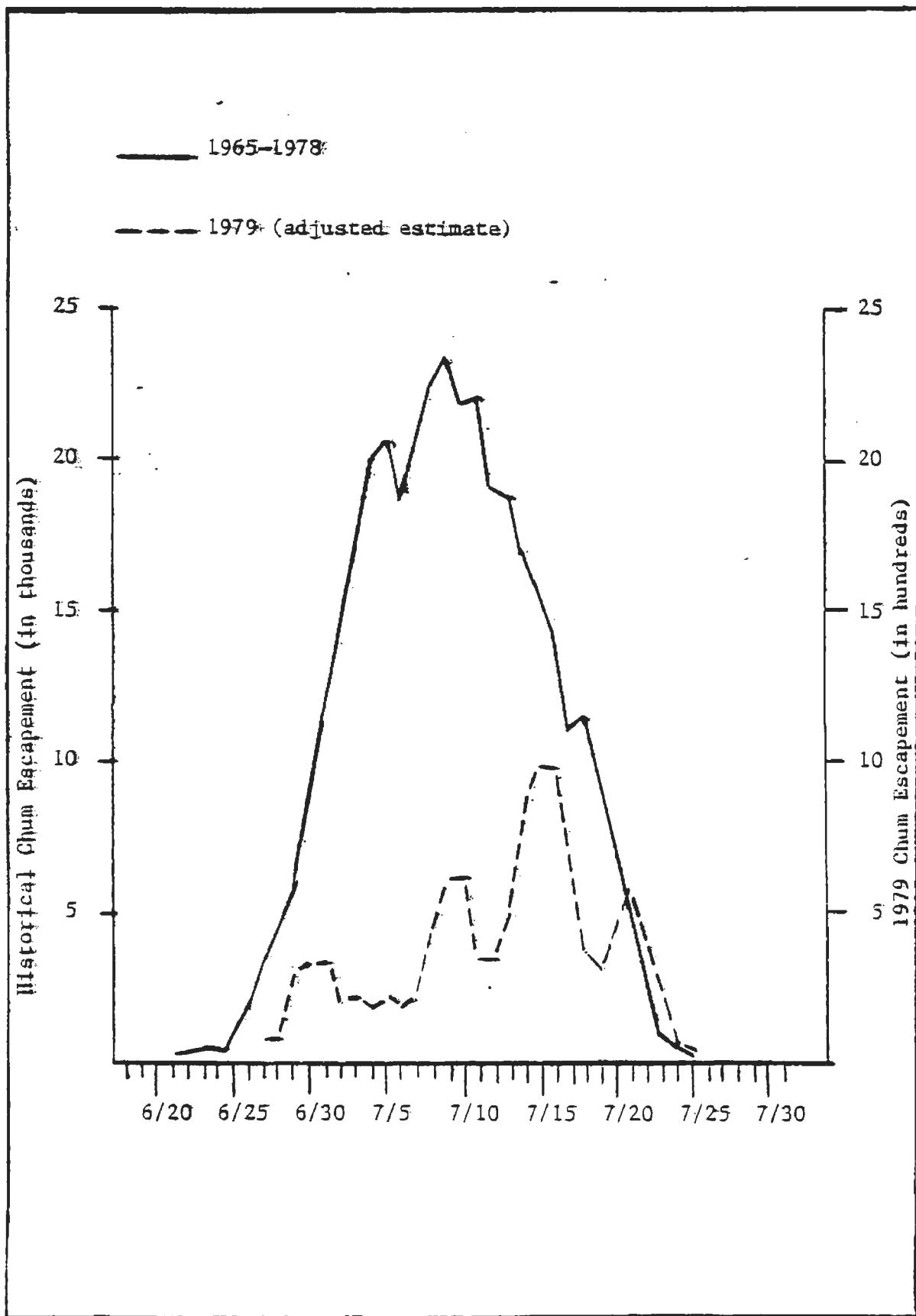


Figure 5. Historical and 1979 chum salmon escapements, Kwiniuk River (smoothed by 3's).

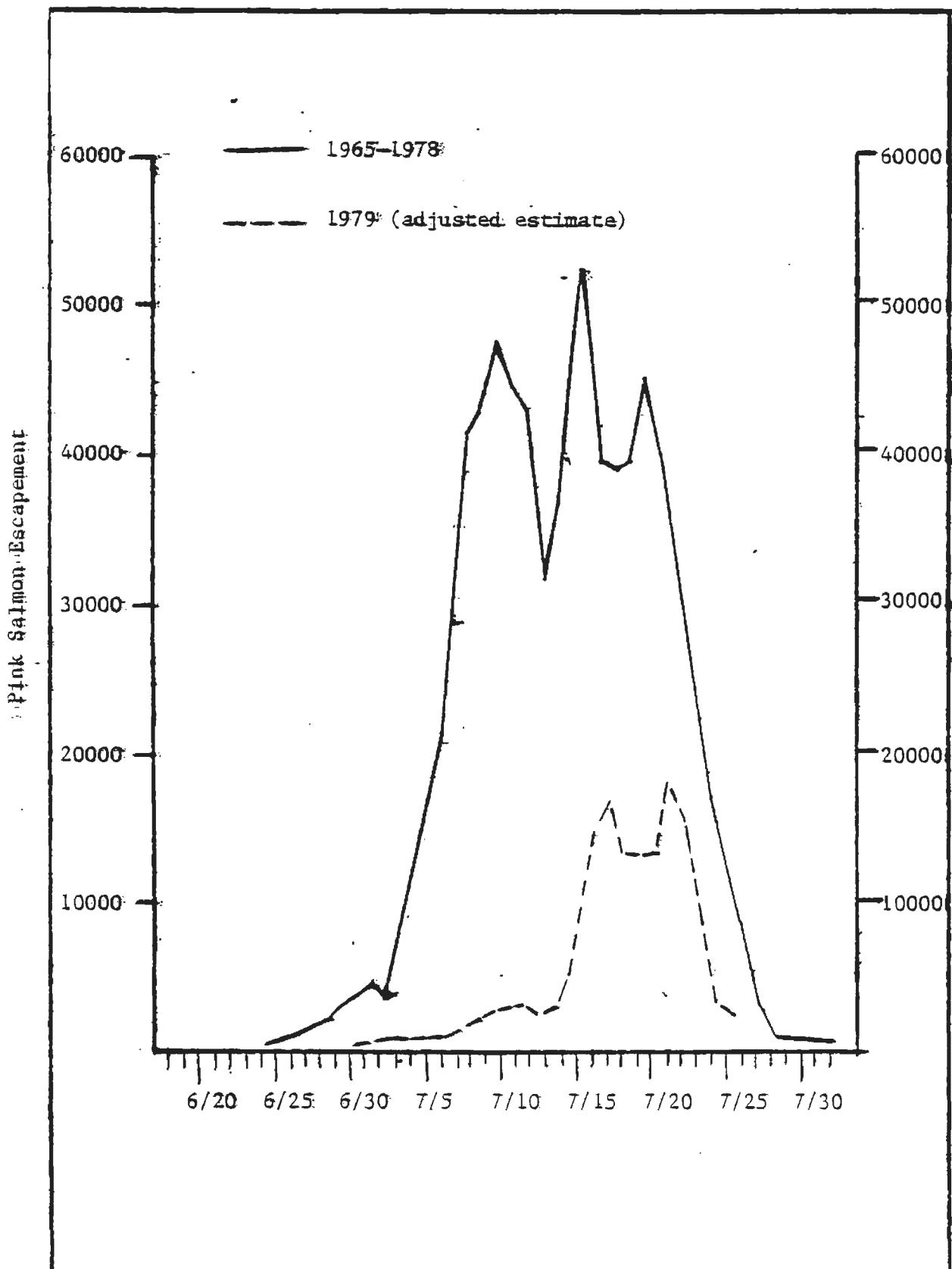


Figure 6. Historical and 1979 pink salmon escapements, Kwiniuk River (smoothed by 3's).

Table 1. Estimates of daily salmon migration past Kwiniuk River tower, using expanded 10 minute counts, Kwiniuk River, 1979.

Date	<u>Chum Salmon</u>			<u>Pink Salmon</u>		
	10 Minute Counts	Expanded 1/ 10 Minute Counts	Actual Counts	10 Minute Counts	Expanded 1/ 10 Minute Counts	Actual Counts
		10 Minute Counts	Actual Counts		10 Minute Counts	
7/08	34	204	188	268	1608	1485
7/09	249	1494	914	588	3528	3197
7/10	130	780	708	534	3204	3002
7/11	34	204	202	367	2202	1610
7/12	21	126	110	271	1626	1259
7/13	107	642	708	689	4134	4498
7/14	130	780	630	1365	8190	7759
7/15	150	900	1275	2460	14760	16418
7/16	226	1356	1055	3224	19344	19100
7/17	90	540	561	2248	13488	12514
7/18	36	216	198	1253	7518	6349
7/19	74	444	317	2635	15810	18255
7/20	72	432	416	1930	11580	12954
7/21	158	948	587	4240	25440	20887
7/22	121	726	663	4507	27042	19337
7/23	15	90	89	909	5454	4503
TOTALS	1647	9882	8621	27488	164928	153127

1/ Expanded to eighteen hour count.

Table . . Daily/Hourly salmon migration past Kwiniuk 1 hr counting tower, 1979. Species: CHUM

Hour/ Date	00	01	02	03	04	05	12	13	14	15	16	17	18	19	20	21	22	23	Daily Total	% Daily Total
6/27	-	-	-	-	-	-	-	-	-	-	-	-	2	0	4	-	-	6	0.0	
6/28	-	-	-	-	-	-	-	0	0	-	2	5	6	-	41	-	-	54	0.5	
6/29	-	-	-	-	-	-	-	-	-	-	-	9	0	12	21	20	-	-	62	0.6
6/30	-	-	-	-	-	-	-	-	17	-	25	-	-	168	75	18	-	-	303 <sup>1/</sup>	3.0
7/01	-	-	-	-	-	-	-	-	-	-	-	53	22	32	26	21	-	-	154	1.6
7/02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	7	4	48	65	0.6
7/03	-	-	-	-	-	-	-	-	-	7	6	9	31	41	-	-	-	-	94	0.9
7/04	-	-	-	-	-	-	-	-	18	29	4	9	-	74	5	5	18	13	175	1.8
7/05	-	-	-	-	-	-	-	-	0	2	5	-2	2	4	3	13	-	-	27	0.3
7/06	-	-	-	-	-	-	9	8	12	9	19	16	45	22	59	44	23	-	266	2.7
7/07	-	-	-	-	-	-	2	-3	-1	4	7	4	0	16	42	33	30	21	155	1.5
7/08	0	0	3	14	0	1	4	29	28	1	5	4	5	24	27	22	16	5	188	1.9
7/09	0	0	1	1	0	2	9	3	6	13	19	85	151	345	84	103	52	40	914	9.2
7/10	18	12	33	26	1	10	11	3	8	7	11	16	21	202	109	47	133	40	708	7.1
7/11	2	4	2	0	1	0	3	1	1	0	0	3	1	9	62	63	21	29	202	2.0
7/12	3	11	1	1	0	0	0	0	0	0	0	6	1	2	9	30	29	17	110	1.1
7/13	2	10	10	0	3	0	8	10	3	40	50	67	159	164	52	40	4	86	708	7.1
7/14	7	5	10	0	1	1	24	17	4	6	16	63	0	81	82	99	130	84	630	6.3
7/15	271	56	54	44	12	15	5	1	7	23	2	2	0	5	100	192	214	272	1275	12.8
7/16	48	22	18	1	5	0	8	-1	0	13	13	18	70	64	83	443	198	52	1055	10.6
7/17	37	17	8	6	0	0	0	1	26	6	12	18	8	39	29	136	115	103	561	5.6
7/18	42	-1	13	13	-16	-31	0	0	0	-4	0	1	10	14	25	46	55	31	198	2.0
7/19	9	7	13	13	8	2	1	0	0	0	16	2	6	43	51	54	41	51	317	3.2
7/20	43	21	9	6	6	0	1	0	0	8	14	54	35	19	26	54	62	57	416	4.2
7/21	127	36	30	10	9	2	0	0	0	1	9	97	35	59	77	67	14	14	587	5.9
7/22	14	26	7	20	12	1	0	1	9	3	0	77	915	154	112	24	3	5	663	6.6
7/23	21	0	0	3	0	0	2	0	0	0	0	5	3	22	23	2	4	4	89	0.9
7/24	2	1	2	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	8	0.0
7/25	-	-	-	-	-	-	0	0	0	1	2	3	5	1	-	-	-	-	12	0.0

Hourly

Total	646	227	214	158	42	3	88	70	138	171	237	625	811	1618	1229	1587	1166	972	10,002
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% of

Hourly

Total	6.5	2.3	2.1	1.6	0.4	0.0	0.8	0.7	1.4	1.7	2.4	6.2	8.1	16.2	12.3	15.9	11.7	9.7
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100.0

1/ 1,000 additional chum salmon noted after uncounted period.

Table 3. Daily/Hourly salmon migration past Kwiniuk river counting tower, 1979. Species: PINK

Hour/ Date	00	01	02	03	04	05	12	13	14	15	16	17	18	19	20	21	22	23	Daily Total	%Daily Total
6/27	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	0	0.0	
6/28	-	-	-	-	-	-	-	0	0	-	0	0	0	-	6	-	-	6	0.0	
6/29	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	-	-	0	0.0	
6/30	-	-	-	-	-	-	-	0	-	0	-	-	11	64	21	-	-	96	0.1	
7/01	-	-	-	-	-	-	-	-	-	-	21	56	60	64	25	-	-	226	0.1	
7/02	-	-	-	-	-	-	-	-	-	-	-	-	19	34	-10	-26	17	0.0		
7/03	-	-	-	-	-	-	-	1	0	7	30	63	-	-	-	-	-	101	0.1	
7/04	-	-	-	-	-	-	-	-	-11	21	6	8	-	169	28	14	36	17	288	0.2
7/05	-	-	-	-	-	-	-	-	-	3	12	-3	6	25	1	16	32	-	92	0.0
7/06	-	-	-	-	-	-	48	19	9	2	70	35	174	106	192	94	73	-	822	0.5
7/07	-	-	-	-	-	-	29	-12	-1	75	25	138	12	394	739	313	327	81	2120	1.3
7/08	0	0	18	10	0	24	77	141	417	35	133	11	86	178	192	61	67	35	1485	0.9
7/09	0	0	7	14	20	0	40	0	11	25	40	76	112	845	816	742	293	156	3197	2.0
7/10	73	91	151	92	13	12	78	17	110	62	62	126	178	592	291	281	583	190	3002	1.9
7/11	313	97	82	64	6	0	21	5	3	0	4	10	41	45	80	352	336	151	1610	1.0
7/12	14	51	138	20	1	2	1	3	6	5	7	29	43	62	110	250	362	147	1259	0.8
7/13	37	19	94	0	11	3	9	75	16	108	300	401	671	807	400	426	232	889	4498	2.9
7/14	85	22	73	15	4	18	131	20	24	27	122	377	0	1080	725	1666	1856	1514	7759	4.9
7/15	2675	868	826	910	456	146	37	-5	40	172	52	50	56	237	900	1964	3948	3086	16418	10.5
7/16	1066	179	103	256	323	-6	9	7	12	398	245	164	727	2260	4422	5614	3500	821	19100	12.1
7/17	650	155	124	367	90	11	44	129	619	157	323	390	690	1243	1144	2831	1948	1599	12514	7.9
7/18	690	-83	-63	-485	-460	-574	1	-1	28	-48	12	24	148	503	925	2594	2226	912	6349	4.0
7/19	299	142	208	223	66	16	16	0	0	7	380	187	341	5835	5200	2036	1640	1659	18255	11.6
7/20	1135	196	105	148	77	36	5	8	11	118	284	677	2313	2438	1410	944	1232	1817	12954	8.2
7/21	1932	156	204	339	479	130	3	17	53	825	-64	4787	2404	2130	2283	4281	624	304	20887	13.3
7/22	208	118	83	250	247	78	22	102	368	100	132	3368	6932	4341	1979	630	203	176	19337	12.3
7/23	74	11	14	24	27	4	89	207	83	230	635	495	552	600	912	148	358	40	4543	2.9
7/24	234	26	8	-	-	-	-	-	-	151	-	46	-	-	-	-	-	465	0.3	
7/25	-	-	-	-	-	-	9	21	3	21	67	29	41	77	-	-	-	268	0.2	

## Hourly

Total	9485	2048	2175	2247	1360	-100	669	753	1802	2494	2854	11466	15646	24038	22902	25345	18866	13568	157628
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## % of

## Hourly

Total	6.0	1.3	1.4	1.4	0.9	-0.1	0.4	0.5	1.2	1.6	1.8	7.3	9.9	15.2	14.5	16.1	12.0	8.6	100,00.0
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Table 4. Actual and estimated daily salmon migration, Kwiniuk River, 1979.

Date	Chum		Pink	
	Actual Daily Total	Estimated Daily Total	Actual Daily Total	Estimated Daily Total
6/27	6	14	0	0
6/28	54	174	6	17
6/29	62	106	0	0
6/30	303*	629	96	196
7/1	154	262	226	359
7/2	65	131	17	33
7/3	94	272	101	463
7/4	175	254	288	480
7/5	27	42	92	114
7/6	266	344	822	1021
7/7	155	178	2120	2379
7/8	188	188	1485	1485
7/9	914	914	3197	3197
7/10	708	708	3002	3002
7/11	202	202	1610	1610
7/12	110	110	1259	1259
7/13	708	708	4498	4498
7/14	630	630	7759	7759
7/15	1275	1275	16418	16418
7/16	1055	1055	19100	19100
7/17	561	561	12514	12514
7/18	198	198	6349	6349
7/19	317	317	18255	18255
7/20	416	416	12954	12954
7/21	587	587	20887	20887
7/22	663	663	19337	19337
7/23	89	89	4543	4543
7/24	8	42	465	2742
7/25	12	32	268	707
	10002	11101	157628	161578

\*1,000 additional chum salmon noted during non-index period

Table 5. Chum and pink salmon migration rate, Kwiniuk River 1965-1978

<u>Date</u>	<u>Chum</u>	<u>Pink</u>	
<u>Daily</u>	<u>Daily %</u>	<u>Daily</u>	<u>Daily %</u>
6/18	6	-	-
6/19	40	-	-
6/20	89	-	1
6/21	109	.0002	1
6/22	470	.0012	37
6/23	530	.0013	184
6/24	575	.0014	241
6/25	190	.0004	420
6/26	2793	.0072	1490
6/27	3198	.0083	1187
6/28	4615	.0120	1722
6/29	6302	.0163	2875
6/30	7038	.0183	4166
7/1	14792	.0384	3557
7/2	12872	.0334	5056
7/3	16438	.0427	1076
7/4	22398	.0582	14146
7/5	21098	.0548	16146
7/6	18098	.0470	20760
7/7	16905	.0439	25890
7/8	27765	.0722	44948
7/9	22453	.0583	51315
7/10	21147	.0549	31593
7/11	22018	.0572	58095
7/12	23300	.0605	44790
7/13	12378	.0321	24489
7/14	17857	.0464	24355
7/15	20583	.0535	61096
7/16	9247	.0240	48939
7/17	14761	.0383	46101
7/18	9272	.0241	23834
7/19	10838	.0281	46842
7/20	8493	.0220	46566
7/21	3378	.0087	40801
7/22	3168	.0082	30549
7/23	2257	.0068	22579
7/24	3340	.0086	13137
7/25	1680	.0043	15347
7/26	1330	.0034	6800
7/27	422	.0010	2095
7/28	151	.0003	564
7/29	91	.0002	280
7/30	17	-	514
7/31	9	-	244
8/1	12	-	124

Table 6. Comparison of chum salmon escapement estimates via salmon counting tower and aerial survey methods, Kwiniuk River, 1979.

Date	Tower Count <sup>1/</sup>	Aerial Survey Count
6/27	0	less than 100
7/8	2,406	3,081
7/12	4,418	6,610

1/ Tower counts through 6/26, 7/7, 7/11

Table 7 . Water temperatures, and pink and chum migration percentages,  
Kwiniuk River, 1979.

<u>Date</u>	<u>Temperature</u> <u>Celsius</u>	<u>Pink</u> <u>% of Migration</u>	<u>Chum</u> <u>% of Migration</u>
6/27	-	0.0	0.0
6/28	7.0	0.0	0.5
6/29	8.0	0.0	0.6
6/30	12.0	0.1	3.0
7/01	9.5	0.1	1.6
7/02	9.5	0.0	0.6
7/03	9.0	0.1	0.9
7/04	9.0	0.2	1.8
7/05	6.5	0.0	0.3
7/06	7.0	0.5	2.7
7/07	7.5	1.3	1.5
7/08	8.0	0.9	1.9
7/09	8.0	2.0	9.2
7/10	8.0	1.9	7.1
7/11	8.0	1.0	2.0
7/12	10.0	0.8	1.1
7/13	10.0	2.9	7.1
7/14	12.0	4.9	6.3
7/15	12.0	10.5	12.8
7/16	12.0	12.1	10.6
7/17	12.5	7.9	5.6
7/18	11.0	4.0	2.0
7/19	9.0	11.6	3.2
7/20	12.0	8.2	4.2
7/21	14.0	13.3	5.9
7/22	13.0	12.3	6.6
7/23	13.5	2.9	0.9
7/24	11.0	0.3	0.0
7/25	10.5	0.2	0.0

Appendix Table 1. Comparison of percentage relative error and correlation coefficient in 10-minute expanded counts and actual counts, Kwiniuk River counting tower, 1974-1979.<sup>3/</sup>

Year	CHUM		PINK	
	Relative <sup>1/</sup> Error%	% Correlation <sup>2/</sup>	Relative <sup>1/</sup> Error%	% Correlation <sup>2/</sup>
1974	+5.09	95.12	+12.55	74.40
1975	-3.31	93.06	+6.36	87.97
1976	-24.49	83.51	-7.47	83.94
1977	+2.20	73.66	-7.47	96.86
1978	-5.45	83.10	-27.12	88.81
1979	-14.6	75.6	-7.7	94.97
-X	-6.76	84.00	-5.14	87.82
Range	29.58	21.46	39.67	72.46

<sup>1/</sup>(Actual counts-10 minute expanded counts) ÷ Actual counts x 100=relative error.

<sup>2/</sup>Correlation coefficient (r),  $r^2 \times 100 = \% \text{ of correlation}$ .

<sup>3/</sup>18-hour counts

Appendix Table 2. Daily total cumulative salmon escapements, Kwiniuk River, 1965-1979.

Species	Date	1965	1966	1967	1968	1969
CHUM	6/18	6				
	6/19		24			
	6/20		50			
	6/21		158			
	6/22		506			
	6/23		759			
	6/24		1,048	5		
	6/25		597	24	66	
	6/26		1,060	77	231	57
	6/27	218	1,189	270	1,066	113
	6/28	983	1,697	315	1,312	427
	6/29	2,576	1,768	1,455	2,838	571
	6/30	3,445	2,180	2,148	3,509	1,475
	7/1	7,741	5,728	2,739	4,443	2,057
	7/2	8,794	7,619	3,027	5,971	2,744
	7/3	9,988	8,054	3,491	6,914	3,861
	7/4	11,050	10,050	5,647	8,427	6,056
	7/5	12,078	11,958	6,157	9,409	7,137
	7/6	12,602	13,184	9,605	10,247	8,107
	7/7	13,445	13,703	13,088	12,428	9,514
	7/8	13,824	15,703	15,691	15,033	10,568
	7/9	15,630	17,703	18,513	16,720	11,727
	7/10	19,147	17,472	21,487	18,003	12,197
	7/11	22,818	19,551	23,459	18,284	12,577
	7/12	23,491	25,549	26,165	18,349	13,200
	7/13	26,444	27,225	26,473	18,415	14,198
	7/14	32,026	27,579	26,459	18,431	14,879
	7/15	32,190	28,604	26,532	18,564	16,057
	7/16	32,437	28,336	26,584	18,590	16,634
	7/17	32,503	28,884	26,598	18,601	17,117
	7/18	32,861	29,965	26,625	18,636	18,345
	7/19		31,584	26,631	18,760	18,707
	7/20		32,154	26,681	18,815	18,918
	7/21		32,389	26,661	18,847	19,233
	7/22		32,723		18,907	19,373
	7/23		32,938		18,951	19,390
	7/24		33,030		19,976	19,525
	7/25		33,137			19,554
	7/26		33,153			19,749
	7/27		33,153			
	7/28		33,184			
	7/29		33,182			
		<u>-6,227<sup>27</sup></u>	<u>-396<sup>27</sup></u>	<u>-2,217<sup>27</sup></u>	<u>-163<sup>27</sup></u>	<u>-52<sup>27</sup></u>
		26,634	32,786	24,444	18,813	19,687

1/1970 was the first year of 18-hour counts, 12 noon until 6AM the next day.  
 The average escapement for the hours from 6AM until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/Subsistence catch.

Appendix Table 2. Daily total cumulative salmon escapements, Kwiniuk River,  
(continued) 1965-1979.

Species	Date	1970	1971	1972	1973	1974	1975
CHUM	6/18						
	6/19					16	
	6/20					79	
	6/21					80	
	6/22					202	
	6/23					479	
	6/24					950	
	6/25	2			11	1,113	
	6/26	17	23		13	3,316	
	6/27		51		17	5,047	
	6/28		95	33	17	6,942	
	6/29	645	139	51	17	8,358	
	6/30	2,302	196	158	26	9,805	
	7/1	3,327	452	697	97	11,266	
	7/2	6,420	728	1,375	207	13,776	
	7/3	14,467	1,181	1,607	402	15,674	
	7/4	20,873	3,362	2,793	1,514	16,985	72
	7/5	26,699	4,783	4,143	4,545	17,972	363
	7/6	30,596	6,178	5,314	4,933	19,061	728
	7/7	31,468	6,651	9,277	5,075	19,479	835
	7/8	34,695	10,677	12,100	8,495	19,766	985
	7/9	40,012	11,539	14,384	8,870	20,126	1,136
	7/10	40,362	13,401	16,242	15,022	20,347	1,446
	7/11	44,180	16,902	17,537	15,337	21,633	1,887
	7/12	47,305	18,694	21,735	16,303	22,745	2,046
	7/13	47,738	19,346	22,997	16,776	23,682	2,354
	7/14	50,304	20,566	24,998	18,944	25,084	3,430
	7/15	56,943	20,858	25,589	19,666	31,243	5,151
	7/16	60,275	21,909	25,805	20,138	32,179	7,395
	7/17	62,577	26,955	26,133	22,396	32,570	9,497
	7/18	63,065	27,836	27,284	24,075	33,388	10,443
	7/19	63,624	30,680	27,993	26,227	33,891	11,919
	7/20	65,673	33,800	28,371	26,995	34,084	12,676
	7/21	65,717	34,473	28,502	27,304	34,209	13,435
	7/22	66,062	35,237	29,020	27,341	34,294	13,809
	7/23	66,176	35,510	29,458	27,570	34,676	13,962
	7/24	66,336	36,185	29,756	28,008	34,979	14,033
	7/25	66,545	36,959	29,995	28,029	35,130	14,049
	7/26	66,584	37,580	30,005		35,161	
	7/27	66,599	38,107				
	7/28	66,602	38,186				
	7/29	66,504	38,243				
		x 2.1% /					
Expanded		1,400	803	631	588	738	295
Escapement		+66,604	+38,243	+30,055	+28,029	+35,161	+14,049
Total		68,004	39,046	30,686	28,617	35,899	14,344
Expanded		-	367 2/				
Escapement			38,679				

Appendix Table 2. Daily total cumulative salmon escapement, Kwiniuk River,  
(continued) 1965-1979.

Species	Date	1976	1977	1978 <sup>3/</sup>	1979 <sup>3/</sup>
CHUM	6/18				
	6/19				
	6/20				
	6/21				
	6/22				
	6/23				
	6/24				
	6/25				
	6/26				
	6/27		12		14
	6/28	6:	271		188:
	6/29	31	468		294
	6/30	33	678		1,923
	7/1	105	2,095		2,185
	7/2	134	2,924		2,316
	7/3	195	4,133		2,588
	7/4	428	4,607	591	2,842
	7/5	746	6,065	1,498	2,884
	7/6	884	7,049	3,163	3,228
	7/7	1,095	8,295	4,203	3,406
	7/8	1,515	11,949	5,320	3,594
	7/9	1,622	14,680	6,112	4,508
	7/10	1,776	16,207	6,812	5,216
	7/11	2,160	18,118	7,496	5,418
	7/12	2,639	19,264	8,754	5,528
	7/13	3,343	19,445	9,181	6,236
	7/14	3,459	19,867	9,448	6,866
	7/15	3,872	20,601	10,173	8,141
	7/16	4,239	20,716	10,470	9,196
	7/17	4,809	20,999	10,564	9,757
	7/18	4,899	21,245	10,803	8,910
	7/19	5,112	21,492	10,827	10,272
	7/20	5,419	21,643	10,891	10,688
	7/21	5,773	21,815	10,952	11,275
	7/22	6,021	22,083	10,957	11,938
	7/23	6,300	22,189		12,027
	7/24	6,384	22,255		12,069
	7/25	6,484	22,289		12,101
	7/26	6,675			
	7/27	6,732			
	7/28	6,770			
	7/29	6,804			
	7/30	6,813			
	8/1	6,834			
		x 2.1%	x 2.1%	x 2.1%	x 2.1%
Expanded		143	468	230	254
Escapement		+6,834	+22,289	+10,957	+12,101
Total		6,977	22,757	11,187	12,355
Expanded		- 511 <sup>2/</sup>			
Escapement		6,466		14,408 <sup>4/</sup>	

<sup>3/</sup> Corrected figures. Expanded to compensate for missing hourly counts.

<sup>4/</sup> Point estimate (range 13,698-15,120). Expanded figure to compensate for fish not counted before 7/4 and after 7/22.

Appendix Table 2. Daily total cumulative salmon escapements, Kwiniuk.  
(continued) River, 1965-1979.

Species	Date	1965	1966	1967	1968	1969
PINK	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					17
	6/27					19
	6/28	174			48	41
	6/29	260			214	52
	6/30	220			534	117
	7/1	276		1	755	131
	7/2	314	11	3	1,330	232
	7/3	349	29	4	1,732	378
	7/4	396	317	6	2,501	1,165
	7/5	388	517		3,141	2,259
	7/6	390	533		4,777	3,974
	7/7	412	568	18	13,719	6,415
	7/8	588	607	45	38,560	8,683
	7/9	650	673	521	67,509	11,406
	7/10	820	683	718	81,776	12,684
	7/11	1,120	722	1,282	105,997	13,539
	7/12	1,526	758	1,926	112,984	15,447
	7/13	1,653	817	2,685	113,323	18,250
	7/14	2,856	898	3,138	113,247	19,379
	7/15	4,488	1,205	3,160	114,504	25,056
	7/16	7,301	1,008	3,320	115,018	27,850
	7/17	7,456	1,206	3,348	117,172	34,863
	7/18	7,571	1,771	3,380	121,392	37,840
	7/19	8,668	3,269	3,406	124,510	43,897
	7/20		3,864	3,432	125,848	47,626
	7/21		4,190	3,567	127,088	51,943
	7/22		5,558	3,587	128,002	54,177
	7/23		6,777		128,466	54,772
	7/24		7,843		129,052	55,741
	7/25		10,015			56,217
	7/26		10,691			57,497
	7/27		10,798			
	7/28		10,864			
	7/29					
		-367 <sup>2/</sup>	-235 <sup>2/</sup>	-79 <sup>2/</sup>	-2,288 <sup>2/</sup>	-814 <sup>2/</sup>
		8,301	10,629	3,508	126,764	36,583

2/Subsistence catch.

Appendix Table 2. Daily total cumulative salmon escapements, Kwiniuk River, 1965-1979.  
 (continued)

Species	Date	1970	1971	1972	1973	1974
PINK	6/18					
	6/19					
	6/20				1	
	6/21				2	
	6/22				39	
	6/23				223	
	6/24				464	
	6/25	3			322	359
	6/26	13			831	1,513
	6/27	16			1,053	2,456
	6/28	17	9	15	1,276	3,455
	6/29	47	12	48	1,413	5,390
	6/30	198	31	513	1,575	8,306
	7/1	298	125	1,490	1,762	10,047
	7/2	465	182	2,780	1,854	12,512
	7/3	1,096	241	2,899	1,938	14,668
	7/4	4,643	552	4,210	2,190	17,674
	7/5	10,949	819	7,564	3,491	19,180
	7/6	20,413	1,221	10,521	3,556	21,600
	7/7	20,159	1,327	21,254	1,631	22,668
	7/8	25,359	2,343	27,662	4,795	23,385
	7/9	30,729	2,490	35,297	4,979	23,781
	7/10	31,459	3,061	39,082	7,079	24,187
	7/11	39,601	5,963	42,529	7,327	24,764
	7/12	50,921	6,462	47,520	8,539	25,504
	7/13	52,800	6,994	49,581	9,281	26,840
	7/14	59,521	7,418	52,553	12,512	29,336
	7/15	90,681	7,519	53,539	13,393	33,294
	7/16	127,335	7,732	53,923	14,569	34,160
	7/17	148,750	9,646	54,483	18,347	34,502
	7/18	155,935	10,401	55,674	21,214	35,690
	7/19	161,963	12,470	57,721	27,748	36,513
	7/20	179,160	13,938	57,698	30,789	36,920
	7/21	185,247	14,571	57,997	32,842	37,086
	7/22	198,958	15,123	59,024	33,249	37,298
	7/23	208,403	15,309	59,576	35,112	38,101
	7/24	214,233	15,485	59,892	36,956	38,568
	7/25	222,209	15,658	60,147	37,070	39,263
	7/26	225,546	15,818	60,246		39,375
	7/27	226,712	15,996	60,256		
	7/28	226,829	16,089			
	7/29	226,831	16,151			
		x 3.66% <sup>1/</sup>	x3.66% <sup>1/</sup>	x3.66% <sup>1/</sup>	x3.66% <sup>1/</sup>	x3.66% <sup>1/</sup>
		8,300	59	2,205	1,356	1,441
Expanded		226,831	+16,151	+60,256	+37,070	+39,375
Escapement		235,131	16,742	62,461	38,426	40,816
			-1082/			
Total Expanded Escapement			16,634			

1/1970 was the first year of 18-hour counts, 12 noon until 6AM the next day. The average escapement for the hours from 6AM until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/Subsistence catch.

Appendix Table 2. Daily total cumulative salmon escapement, Kwiniuk  
(continued) River, 1965-1979.

Species	Date	1975	1976	1977	1978	1979
PINK	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					
	6/27			17		
	6/28		213	35		
	6/29		406	116	17	
	6/30		439	191	213	
	7/1		702	313	572	
	7/2		781	491	605	
	7/3		1,004	592	1,051	
	7/4		1,756	669	98	1,531
	7/5		2,763	884	460	1,662
	7/6	79	3,300	1,240	1,473	2,683
	7/7	185	4,229	2,037	2,341	5,062
	7/8	176	5,869	2,707	3,142	6,547
	7/9	294	6,942	5,478	4,487	9,744
	7/10	584	8,034	9,435	7,227	12,746
	7/11	820	9,903	21,882	9,475	14,356
	7/12	959	11,105	27,876	18,087	15,615
	7/13	1,001	14,384	30,466	26,128	20,113
	7/14	1,013	14,982	33,086	28,619	27,872
	7/15	1,304	16,072	37,508	37,930	44,290
	7/16	1,770	16,947	38,005	41,055	63,390
	7/17	2,529	19,185	39,530	45,077	75,904
	7/18	5,183	19,692	40,232	52,343	82,253
	7/19	10,772	20,121	40,926	54,786	100,508
	7/20	22,354	20,956	41,480	60,573	113,462
	7/21	38,220	22,084	42,361	60,273	134,349
	7/22	45,466	23,038	43,467	69,719	153,686
	7/23	50,902	24,663	44,236		158,229
	7/24	52,935	25,170	44,479		160,871
	7/25	54,358	25,710	44,602		161,578
	7/26	55,293	26,411			
	7/27		27,045			
	7/28		27,333			
	7/29		27,549			
	7/30		28,063			
	7/31		28,307			
	8/1		28,431			
		x3.66% <sup>1/</sup>	x3.66%	x3.66%	x3.66%	x3.66%
		2,024	1,040	1,632	2,351	3,914
Expanded		+55,293	+28,431	+44,602	+69,719	+161,578
Escapement		57,317	29,471	46,234	72,270 <sup>3/</sup>	167,492 <sup>2/</sup>
		- 1,381 <sup>2/</sup>				
Total Expanded Escapement		28,087			75,993 <sup>4/</sup>	

1/1970 was the first year of 18-hour counts, 12 noon until 6AM the next day. The average escapement for the hours from 6AM until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/Subsistence catch.

3/Corrected figure. Expanded to compensate for missing hourly counts.

4/Expanded to compensate for an estimated 9% of total pink escapement not counted after 7/22.